



Test report No.: 2380577R-RFUSV16S-A

TEST REPORT

Product Name	Multimedia device with Bluetooth and WLAN
Trademark	BOSCH
Model and /or type reference	CCS2SBXQ
FCC ID	2AUXS-CCS2SBXQ
IC	25847-CCS2SBXQ
Applicant's name / address	Robert Bosch GmbH Robert-Bosch-Strasse 200, 31139 Hildesheim, Germany
Manufacturer's name	Robert Bosch GmbH
Test method requested, standard	FCC CFR Title 47 Part 15 Subpart C FCC CFR Title 47 Part 15 Subpart E RSS-247 Issue 2 ANSI C63.4: 2014, ANSI C63.10: 2013
Verdict Summary	IN COMPLIANCE
Documented By (Supervisor / Jinn Chen)	<i>Jinn Chen</i>
Tested By (Senior Engineer / Ivan Chuang)	<i>Ivan Chuang</i>
Approved By (Senior Engineer / Alan Chen)	<i>Alan Chen</i>
Date of Receipt	2023/08/17
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Report Version	V1.0

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Appendix 1: Product Photos-Please refer to the file: 2380577R-Product Photos

Competences and Guarantees

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

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The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. The test results relate only to the samples tested.
2. The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
3. This report must not be used to claim product endorsement by TAF or any agency of the government.
4. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
5. Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Revision History

Report No.	Version	Description	Issued Date
2380577R-RFUSV16S-A	V1.0	Initial issue of report.	2023/11/29

1. General Information

1.1. EUT Description

Product Name	Multimedia device with Bluetooth and WLAN
Trademark	BOSCH
Model and /or type reference	CCS2SBXQ

Note: For more detailed information please refer to report No.: 2380577R-RFUSV01S-A, 2380577R-RFUSV01S-B, 2380577R-RFUSV01S-C and 2380577R-RFUSV03S-A, 2380577R-RFICV08S-A, 2380577R-RFICV08S-B, 2380577R-RFICV08S-C and 2380577R-RFICV08S-D.

Antenna List

Internal Antenna

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	BOSCH	W701	Integrated as printed circuit board antenna	-0.3 dBi for 2400 MHz 3.1 dBi for 5150~5250 MHz 0.5 dBi for 5725~5850 MHz
		W702		1.6 dBi for 2400 MHz 3.9 dBi for 5150~5250 MHz 3.4 dBi for 5725~5850 MHz

External Antenna

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	NISSEI ELECTRIC	ANT2420-161CW/U-AB	Metal Plate Antenna	1.65 dBi for 2400 MHz 2.97 dBi for 5150~5250 MHz 3.74 dBi for 5725~5850 MHz
2	NISSEI ELECTRIC	Single ANT2420-161CW/U-AB		1.31 dBi for 2400 MHz 4.34 dBi for 5150~5250 MHz 5.77 dBi for 5725~5850 MHz
3	Harada Industry	259D57LA0A		1.48 dBi for 2400 MHz 2.89 dBi for 5150~5250 MHz 4.24 dBi for 5725~5850 MHz
4	Harada Industry	Single 259D57LA0A		-3.48 dBi for 2400 MHz 1.08 dBi for 5150~5250 MHz 2.93 dBi for 5725~5850 MHz

Note:

1. The antenna of EUT is conforming to FCC 15.203.
2. The antenna gain as by the manufacturer provided.
3. Each antenna has been evaluated and only the worst case (higher gain antenna) is presented in the report.

Note:

1. The EUT is a Multimedia device with Bluetooth and WLAN with a built-in WLAN and Bluetooth transceiver.
2. The product includes two configurations with the following as below:

Model name	HW Version Identification Number (HVIN)	Description
CCS2SBXQ	NA1	Internal Antenna / External Antenna
	NA2	2x Internal Antenna

3. Usage of samples, samples undergoing test have been selected by: The client.

ID	Bosch Part No	Control Number	Description
01	7 515 752 687-02	PSR-2054085	Internal / External antenna
02	7 515 752 687-02	PSR-2054083	Internal / External antenna (modified)
03	7 515 752 799-01	PSR-2054086	2x Internal antenna

Notes referenced to samples during the project:

ID	Type
01	Radiated
02	Conducted
03	Radiated

4. Only worst case is shown in the report.
5. The test results meet all the applicable FCC / ISED rules, including FCC Part 15C, Part 15E, RSS-247.

Test Mode (Simultaneous Transmit)	Mode 1	802.11a 5745 MHz + 802.11b 2412 MHz
	NA1 (Single ANT2420-161CW/U-AB)	802.11a 5745 MHz + BLE 2M 2480 MHz
	Mode 2	
	NA1 (ANT2420-161CW/U-AB)	802.11b 2412 MHz + BLE 2M 2480 MHz
	Mode 3	802.11b 2462 MHz + BLE 2M 2480 MHz
	NA2	802.11a 5745 MHz + 802.11b 2462 MHz
		802.11a 5745 MHz + BLE 2M 2480 MHz

Note: The following configurations were selected based on transmitter radiated spurious emissions tests identified those corresponding to the worst-cases.

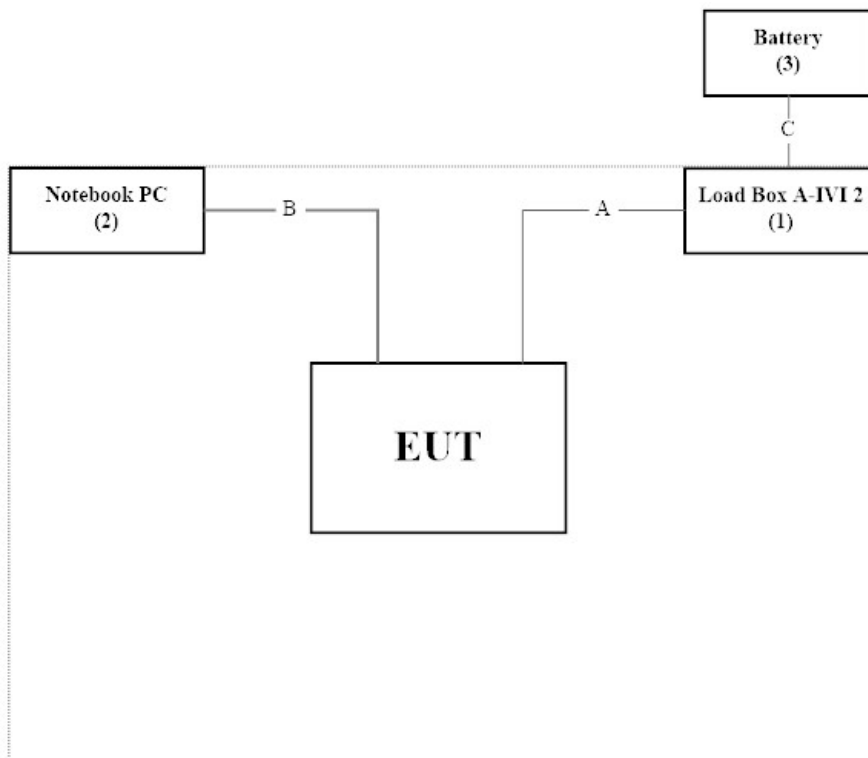
1.2. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Load Box A-IVI 2	BOSCH	N/A	N/A
2	Notebook PC	DELL	Latitude 5501	4H94P13
3	Battery	BOSCH	60044	N/A

Cable Type	Cable Description
A	Signal Cable
B	USB Cable
C	Power Cable

1.3. Configuration of Tested System



1.4. EUT Exercise Software

1.	Setup the EUT as shown in Section 1.3.
2.	Execute software “cmd version 10.0.19045.3570” on the Notebook PC.
3.	Configure the test mode, the test channel, and the data rate.
4.	Press “OK” to start the continuous Transmit.
5.	Verify that the EUT works properly.

1.5. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Radiated Emission	Temperature (°C)	10~40 °C	22.0 °C
	Humidity (%RH)	10~90 %	60.0 %

USA	FCC Registration Number: TW0033
Canada	CAB Identifier Number: TW3023 / Company Number: 26930

Site Description	Accredited by TAF
	Accredited Number: 3023

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
	Linkou Laboratory
Address	No.5-22, Ruishukeng Linkou District, New Taipei City, 24451, Taiwan, R.O.C.
Performed Location	No. 26, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan, R.O.C.
Phone Number	+886-3-275-7255
Fax Number	+886-3-327-8031

1.6. List of Test Item and Equipment

For Radiated Measurements /HY-CB01

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
	Loop Antenna	AMETEK	HLA6121	56736	2023/05/23	2024/05/24
V	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-0675	2023/08/09	2025/08/08
V	Horn Antenna	RF SPIN	DRH18-E	210802A18ES	2023/03/23	2024/03/22
V	Horn Antenna	Com-Power	AH-840	101101	2021/11/30	2023/11/29
V	Pre-Amplifier	SGH	0301	20211007-7	2023/01/10	2024/01/09
V	Pre-Amplifier	EMCI	EMC051845SE	980632	2023/01/10	2024/01/09
V	Pre-Amplifier	EMCI	EMC05820SE	980362	2023/01/10	2024/01/09
V	Pre-Amplifier	EMCI	EMC184045SE	980369	2023/01/10	2024/01/09
	Coaxial Cable	EMCI	EMC102-KM-KM-600	1160314		
	Coaxial Cable	EMCI	EMC102-KM-KM-7000	170242		
V	Filter	MICRO TRONICS	BRM50702	G251	2023/01/05	2024/01/04
	Filter	MICRO TRONICS	BRM50716	G067	2023/01/05	2024/01/04
V	EMI Test Receiver	R&S	ESR3	102792	2022/12/29	2023/12/28
V	Spectrum Analyzer	R&S	FSV3044	101115	2023/01/06	2024/01/05
V	Coaxial Cable	SUHNER	SUCOFLEX 106	25450/6	2023/01/10	2024/01/09
	Coaxial Cable	SGH	HA800	GD20110222-8		
	Coaxial Cable	SGH	SGH18	2021003-8		
	Coaxial Cable	EMCI	EMC106	151113		

Note:

1. Bi-Log Antenna and Horn Antenna(AH-840) is calibrated every two years, the other equipments are calibrated every one year.
2. The test instruments marked with “V” are used to measure the final test results.
3. Test Software Version: e3 230303 dekra V9.

1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document.

The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

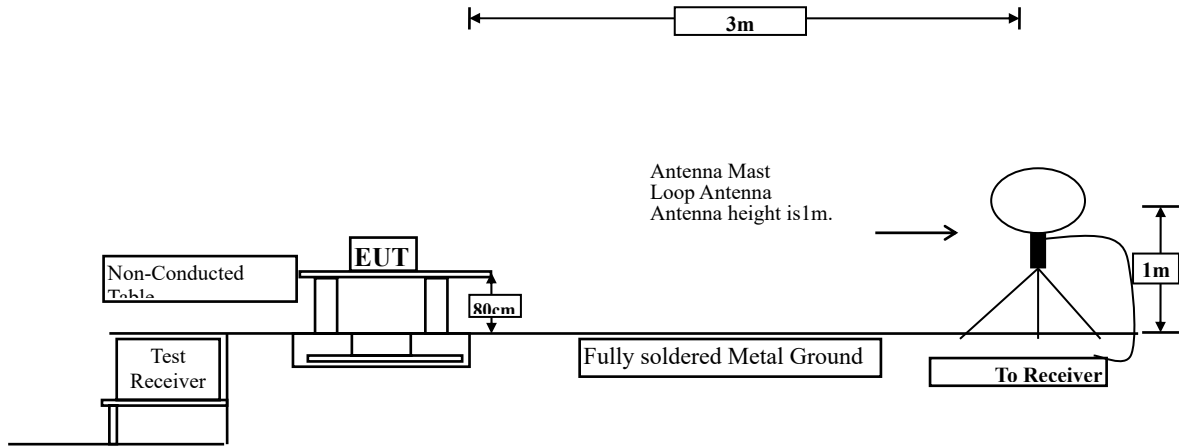
Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test item	Uncertainty
Radiated Emission	9 kHz~30 MHz: ± 3.88 dB
	30 MHz~1 GHz: ± 4.42 dB
	1 GHz~18 GHz: ± 4.28 dB
	18 GHz~40 GHz: ± 3.90 dB

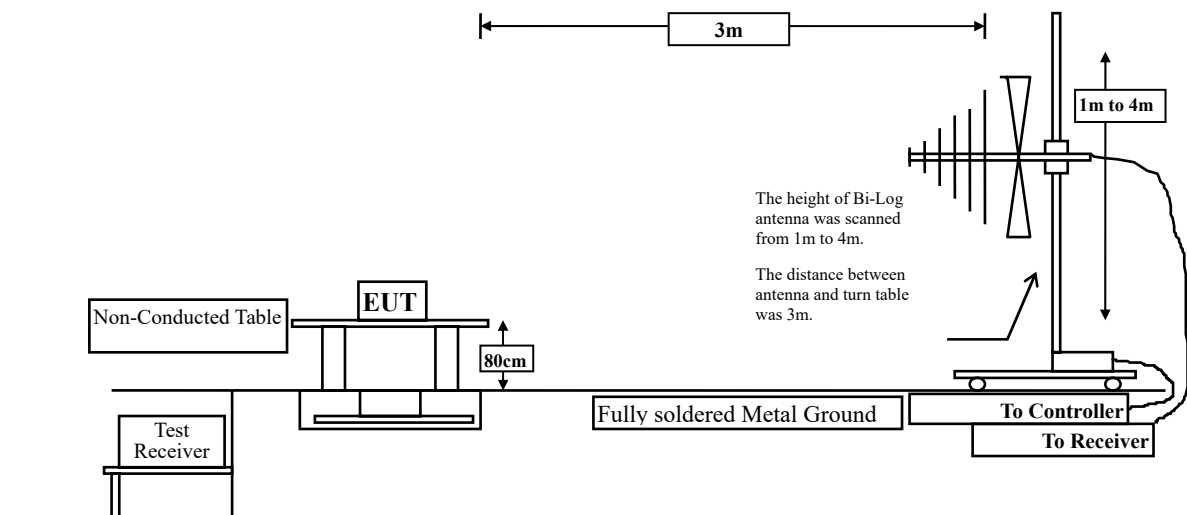
2. Radiated Emission

2.1. Test Setup

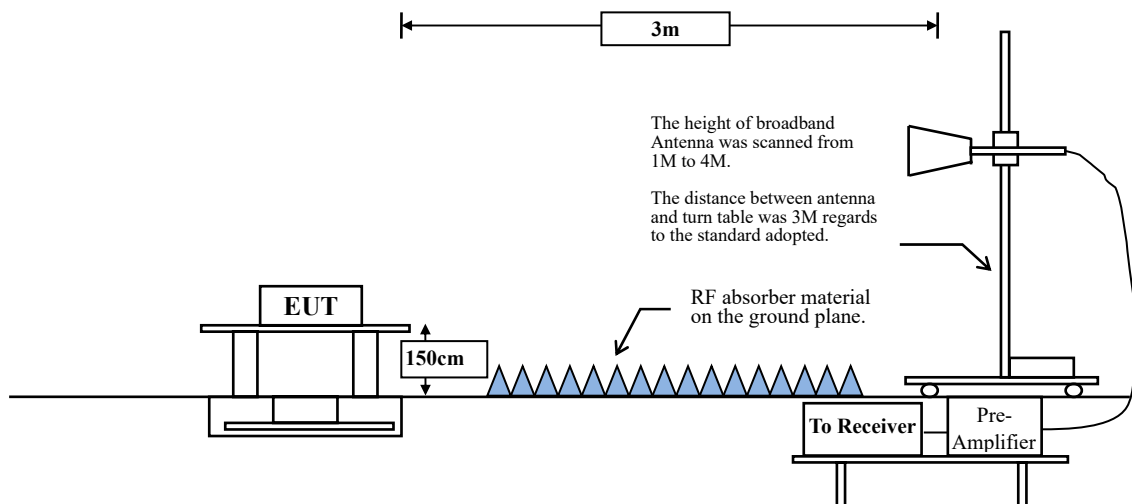
Radiated Emission Under 30 MHz



Radiated Emission Below 1 GHz



Radiated Emission Above 1 GHz



2.2. Limits

➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20 dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
RSS-Gen Issue 5 Section 8.9 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

- Remarks:
1. RF Voltage (dB μ V) = 20 log RF Voltage (μ V)
 2. In the Above Table, the tighter limit applies at the band edges.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

2.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to C63.10:2013 Section 11.12.1 for compliance to FCC 47CFR 15.247 requirements.

Measuring the frequency range below 1 GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30 MHz setting on the field strength meter is 9 kHz and 30 MHz~1 GHz is 120 kHz and above 1 GHz is 1 MHz.

Radiated emission measurements below 30 MHz are made using Loop Antenna and 30 MHz~1 GHz are made using broadband Bilog antenna and above 1 GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The measurement frequency ranges from 9 kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

According to C63.10 Section 11.12.2.4 Peak measurement procedure.

RBW = as specified in Table 1.

VBW \geq 3 x RBW.

Table 1 —RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to C63.10 Section 11.12.2.5 Average measurement procedure.

RBW = 1 MHz.

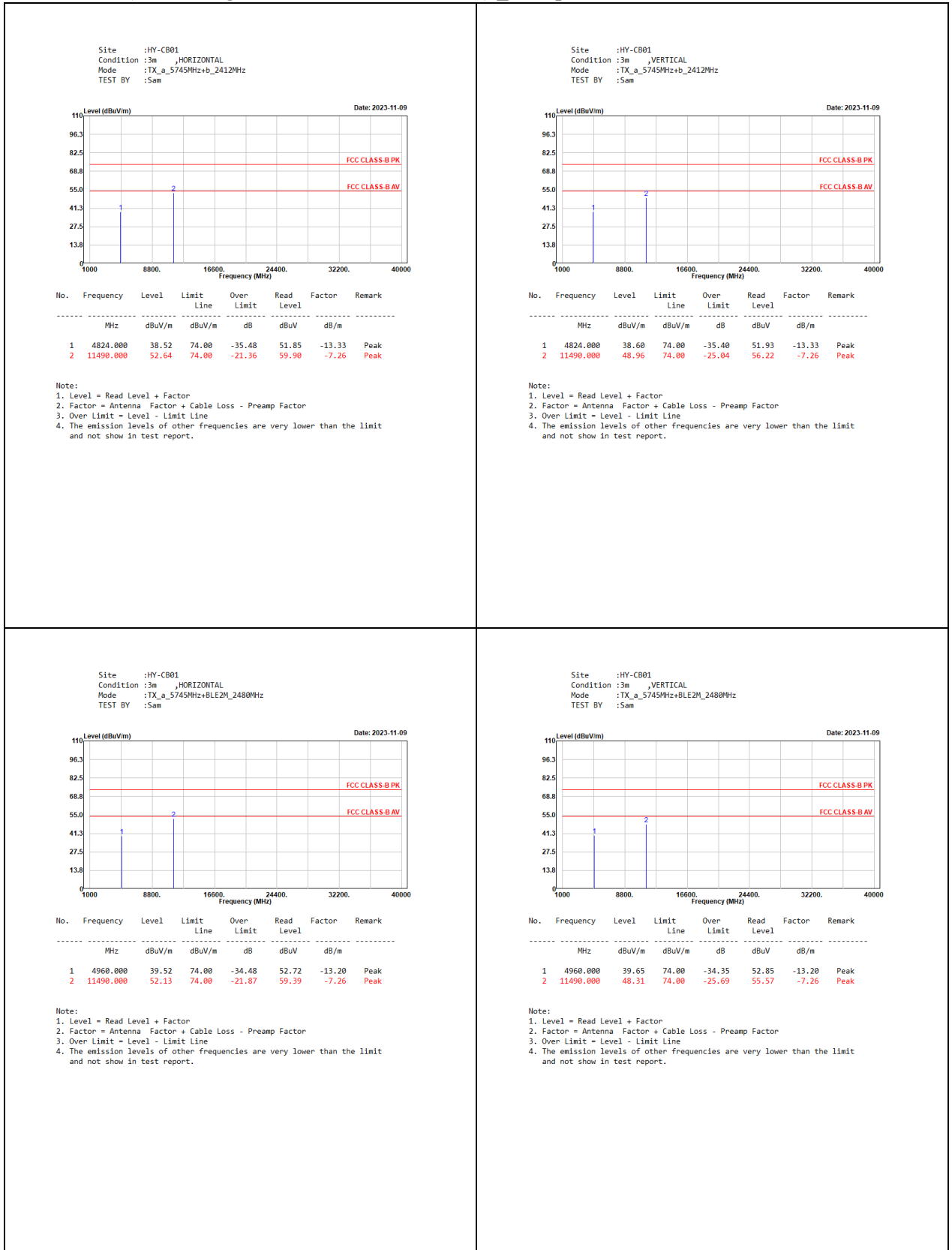
VBW = 10 Hz, when duty cycle \geq 98 %

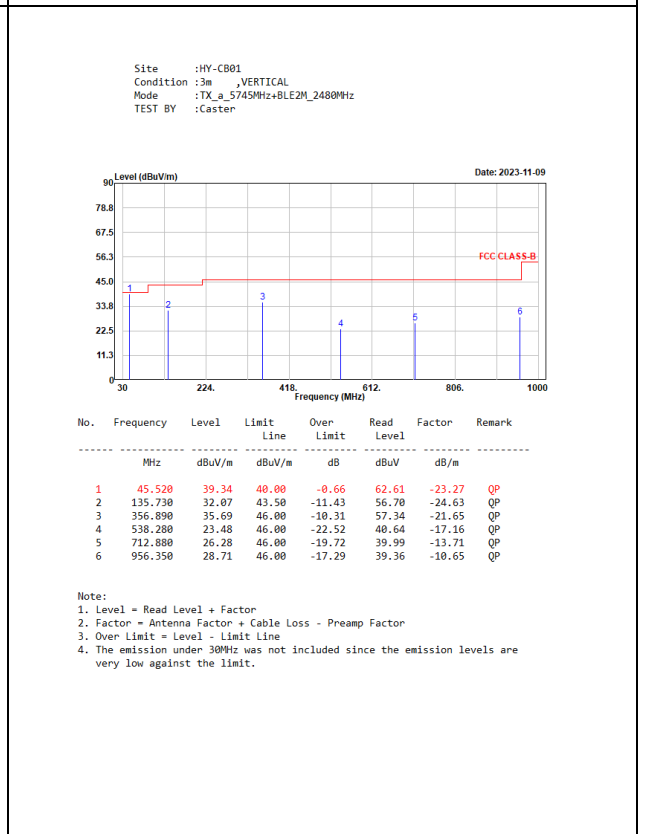
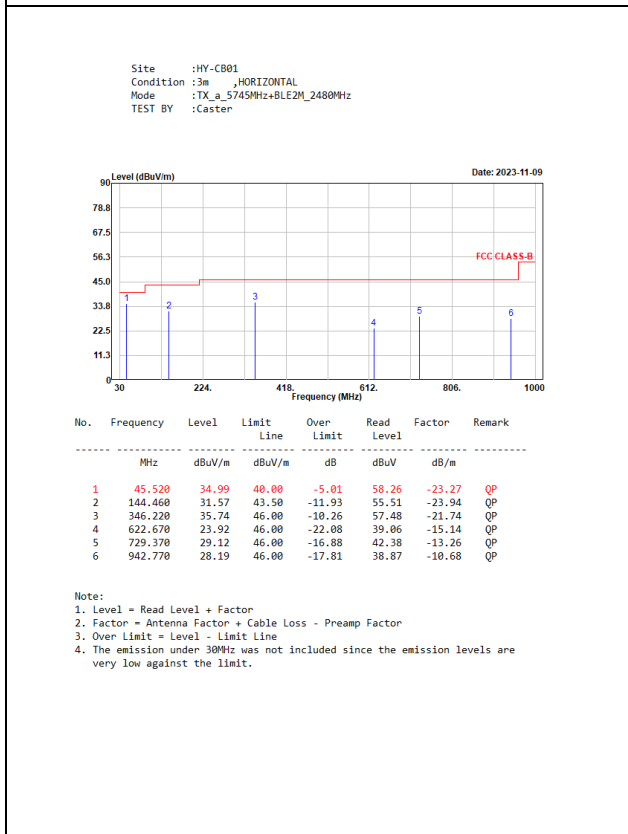
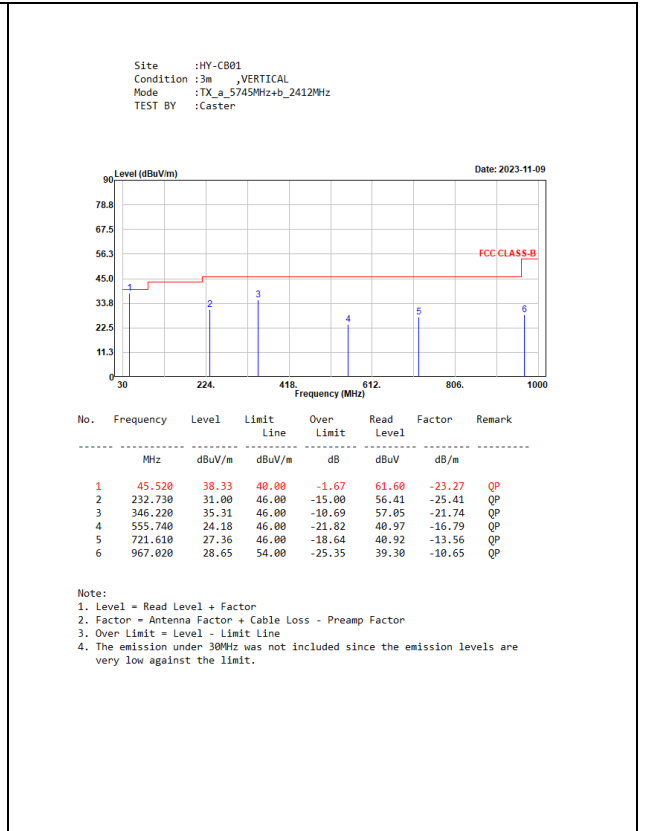
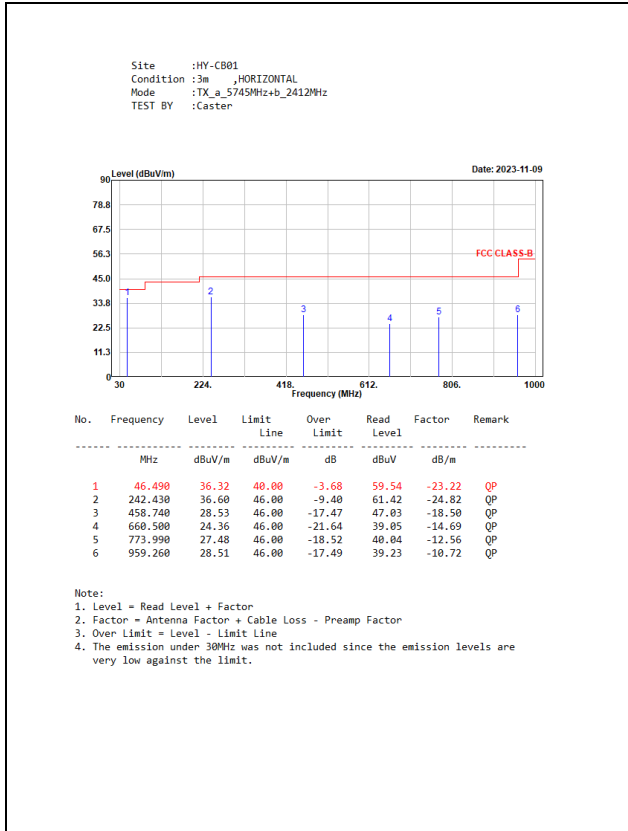
VBW \geq 1/T, when duty cycle < 98 %

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

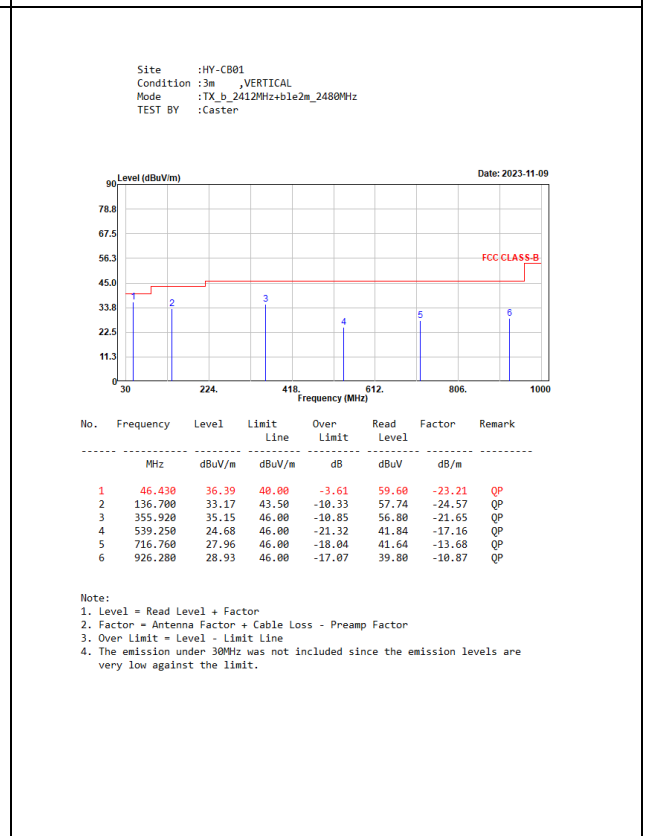
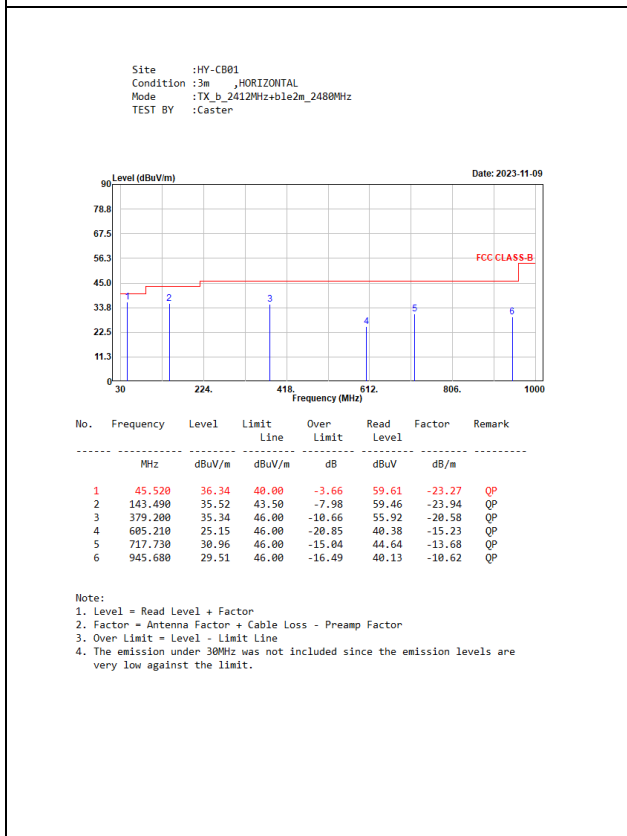
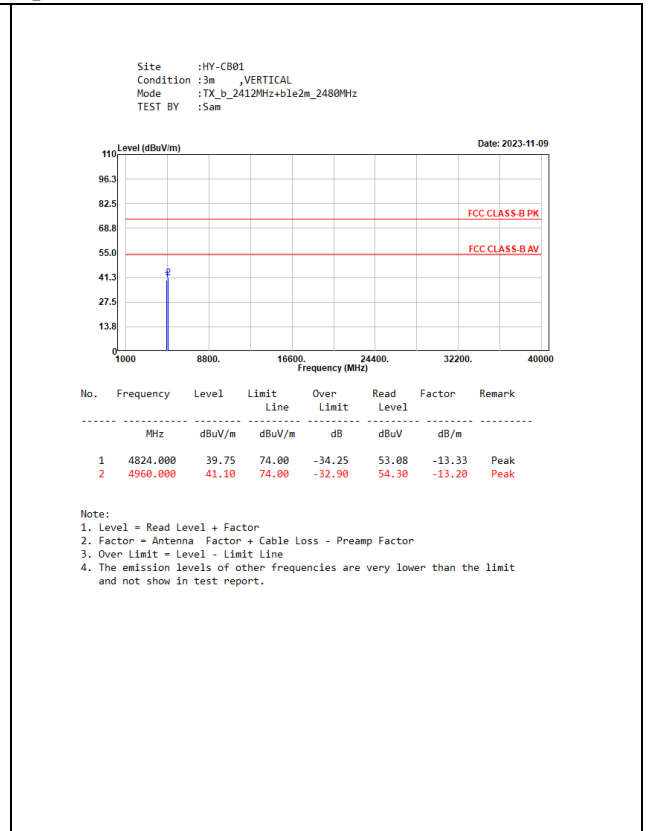
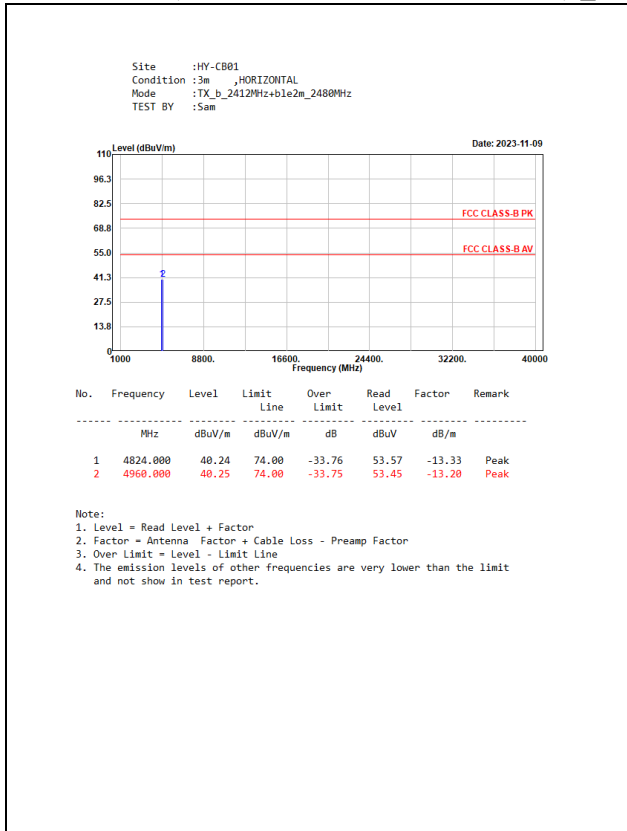
2.4. Test Result of Radiated Emission

Co-Location (NA1 - Single ANT2420-161CW/U-AB) _ Sample ID 01





Co-Location (NA1 - ANT2420-161CW/U-AB) _ Sample ID 01



Co-Location (NA2) _ Sample ID 03

